

Claims

1. An apparatus for sensing parameters and for controlling the transfer of data representing such sensed parameters, the apparatus having limited data computation and storage capability and being located remotely from a base computing station having substantially greater data computation and storage capability, the apparatus comprising:

a data acquisition controller which controls the operation of one or more physical parameter sensors and stores acquired data in progressive data representation format;

a data transmitter which transmits data representing parameters sensed by the one or more parameter sensors to the base station;

an in-situ progressive decision support module which directs the data acquisition controller to obtain data representing one or more physical parameters determined to have relatively highest utility to a decision maker given processing constraints of the control apparatus, and which assigns a transmission priority to such data in its progressive representation format and directs the data transmitter to transmit such data to the base station given the assigned priority, the in-situ progressive decision support model including means for receiving feedback from the base station to adjust the relative utility of data describing physical parameters for use in subsequent data sensing and transmission.

2. The apparatus of claim 1, wherein the in-situ progressive decision support module makes use of a model describing a condition of interest to a decision maker, the model including one or more parameters measurable by the parameter data sensor.

3. The apparatus of claim 2, wherein the model having one or more variables representing measurable parameters.

4. The apparatus of claim 3, wherein the in-situ progressive decision support module determines parameters for which data is to be gathered by taking the first order derivative of the model and ranking the result.

5. The apparatus of claim 3, wherein the in-situ progressive decision support module assigns a transmission priority to gathered data by taking the first order derivative of the model and ranking the result.

6 The apparatus of claim 3, where the model is a linear regression model whose one or more variables are associated with weights indicating the relative utility of the parameter to the decision maker.

7. The apparatus of claim 6 , wherein the apparatus further comprises:
means responsive to the feedback received from the base station for modifying the weights associated with measurable parameters;

means for directing the data acquisition controller to cause further parameter data to be gathered, the further parameter data to be gathered being dependent on changes in utility of such parameter data as indicated by the modified weights; and

means for assigning a modified transmission priority to such further parameter data and directing the data transmitter to transmit such parameter data to the base station given the modified transmission priority, the modified transmission priority being dependent on changes in utility of such parameter data as indicated by the modified weights.

8. A method for use in an apparatus for sensing parameters and controlling the transfer of data representing such sensed parameters, the apparatus having limited data computation and storage capability, located remotely from a base computing station having substantially greater data computation and storage capability, the transmission control apparatus including a data acquisition controller which controls the operation of one or more physical parameter sensors and a data transmitter which transmits data representing parameters sensed by the one or more parameter sensors to the base station, the method comprising:

determining an initial relative utility of parameter data that can be sensed by the apparatus;

directing the data acquisition controller to sense data describing one or more physical parameters determined to have relatively highest utility;

5 assigning a transmission priority to the sensed data;

directing the data transmitter to transmit the sensed data to the base station given the assigned priority;

determining, in response to feedback from the base station, a subsequent relative utility of parameter data for use in subsequent data sensing and transmission.

9. The method of claim 8, wherein the determination of an initial relative utility of parameter data is based on a model describing the utility of such data to a decision maker.

10. The method of claim 9, wherein the model comprises one or more variables representing measurable parameters.

11. The method of claim 9, wherein the determination of an initial relative utility is performed by taking the first order derivative of the model and ranking the result.

12. The method of claim 9, wherein transmission priority is determined by taking the first order derivative of the model and ranking the result.

13 The apparatus of claim 9, where the model is a linear regression model whose one or more variables are associated with weights indicating the relative utility of the parameter to the decision maker.

14. The method of claim 13 , further comprising:

modifying, in response to the feedback received from the base station, the weights associated with measurable parameters,

directing the data acquisition controller to cause further parameter data to be sensed, the further parameter data to be sensed being dependent on changes in utility of such parameter data as indicated by the modified weights; and

assigning a modified transmission priority to such further sensed data and directing the data transmitter to transmit such parameter data to the base station given the modified priority, the modified transmission priority being dependent on changes in utility of such parameter data as indicated by the modified weights.